Green Remediation: An EPA Perspective

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Green Remediation – An EPA Perspective

Outline for Today:

1. Introduction / Definition of Green Remediation
2. History of Related Work
3. Case Studies / Tools

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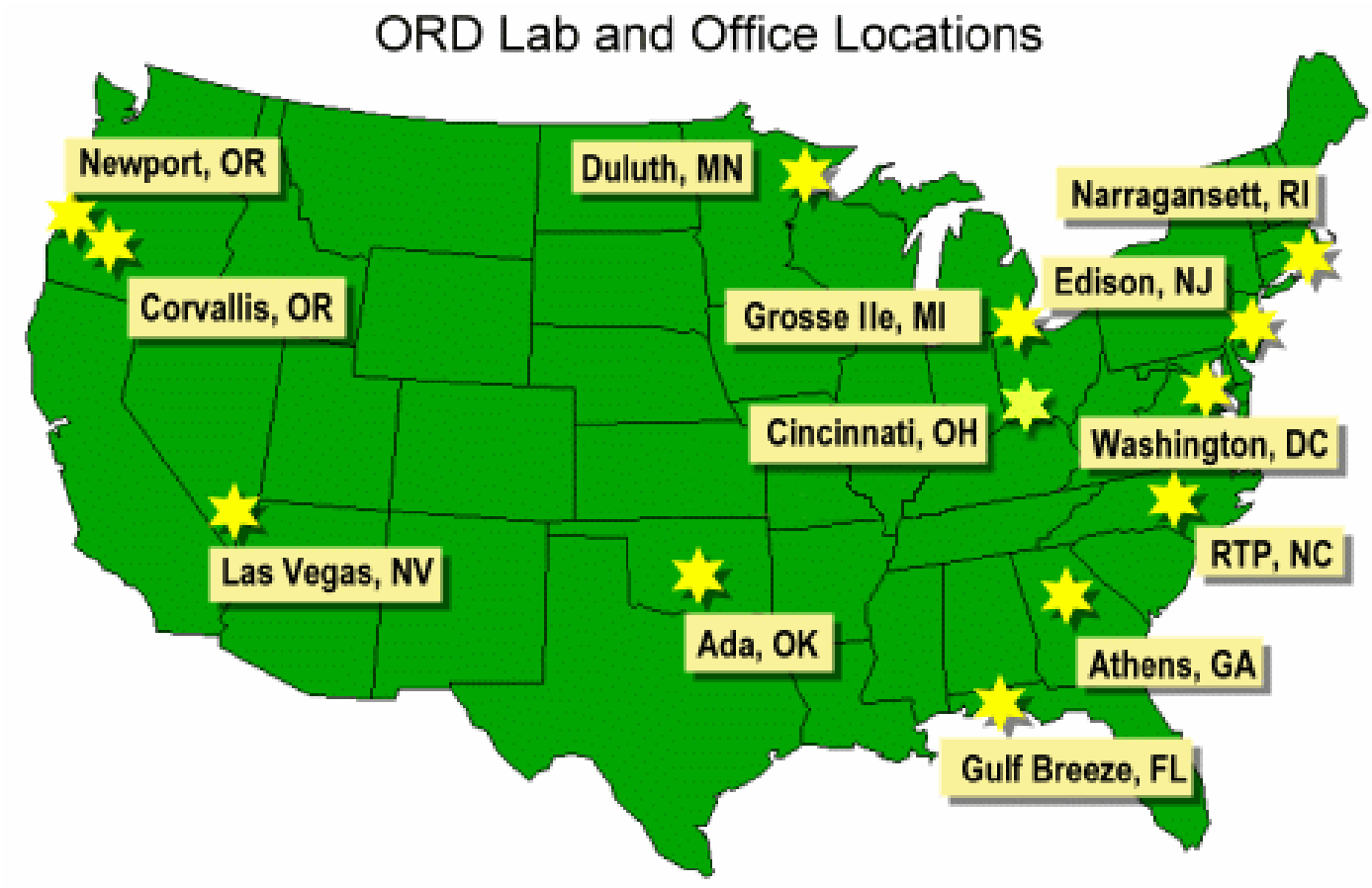
Research and Development at EPA

- 1,858 employees
- $540 million* budget
- $65 million** extramural research grant program
- 13 lab or research facilities across the U.S.
- Provide credible, relevant and timely research results and technical support that inform EPA policy decisions

*FY09 Requested Levels
** FY07 Requested Levels



ORD Lab Locations:
http://www.epa.gov/ord/htm/map.htm

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What is GREEN REMEDIATION?

Green remediation is the practice of considering environmental impacts of remediation activities at every stage of the Remedial process in order to maximize the net environmental benefit of a cleanup. Considerations include selection of a remedy, energy requirements, efficiency of on-site activities, and reduction of impacts on surrounding areas.*

*Ref: http://cluin.org/download/studentpapers/Green-Remediation-Renewables-A-Dellens.pdf

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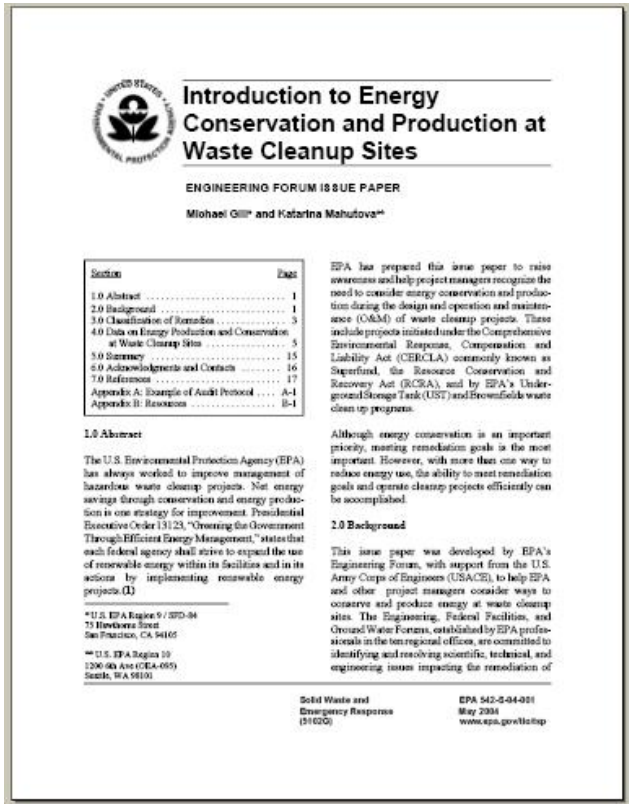
- **EPA Region 9 History**
  - Engineering Forum Issue Paper (May 2004)
  - Version 1 “Energy Calculator” (2005) (unreleased)
  - R9 Cleanup - Clean Air Initiative (2005)
  - R9 Energy Advisor Hired (2007)
  - Smart Energy Resources Guide (May 2008)



Introduction to Energy Conservation and Production at Waste Cleanup Sites

ENGINEERING FORUM ISSUE PAPER

Michael Gill* and Katarina Mahutova**

Section — Page

1.0 Abstract 1
2.0 Background 1
3.0 Classification of Remedies 3
4.0 Data on Energy Production and Conservation at Waste Cleanup Sites 5
5.0 Summary 15
6.0 Acknowledgments and Contacts 16
7.0 References 17
Appendix A: Example of Audit Protocol A-1
Appendix B: Resources B-1

1.0 Abstract

The U.S. Environmental Protection Agency (EPA) has always worked to improve management of hazardous waste cleanup projects. Net energy savings through conservation and energy production is one strategy for improvement. Presidential Executive Order 13123, "Greening the Government Through Efficient Energy Management," states that each federal agency shall strive to expand the use of renewable energy within its facilities and in its actions by implementing renewable energy projects.(1)

EPA has prepared this issue paper to raise awareness and help project managers recognize the need to consider energy conservation and production during the design and operation and maintenance (O&M) of waste cleanup projects. These include projects initiated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) commonly known as Superfund, the Resource Conservation and Recovery Act (RCRA), and by EPA's Underground Storage Tank (UST) and Brownfields waste clean up programs.

Although energy conservation is an important priority, meeting remediation goals is the most important. However, with more than one way to reduce energy use, the ability to meet remediation goals and operate cleanup projects efficiently can be accomplished.

2.0 Background

This issue paper was developed by EPA's Engineering Forum, with support from the U.S. Army Corps of Engineers (USACE), to help EPA and other project managers consider ways to conserve and produce energy at waste cleanup sites. The Engineering, Federal Facilities, and Ground Water Forums, established by EPA professionals in the ten regional offices, are committed to identifying and resolving scientific, technical, and engineering issues impacting the remediation of

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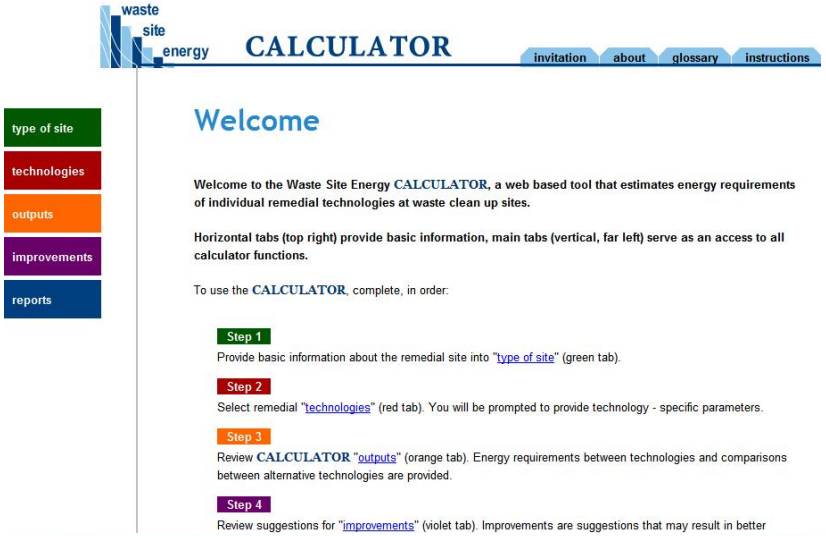
Solid Waste and Emergency Response (5102G)

EPA 542-B-04-001
May 2004
www.epa.gov/tio/tsp



CLEANUP - CLEAN AIR

DIESEL EMISSIONS & GREENHOUSE GAS REDUCTIONS

Electricity and Diesel Emissions Inventory

- Footprint of half of R9 Superfund Sites
- Total diesel emissions from 1985-2009 are estimated to be 3,140 tons NOx, 848 tons CO, and 105 tons PM.
  - ~ 54,000 buses driven across US
- Total CO_2 emissions associated with electricity consumption from 1990-2009 are estimated to be 428,174 tons.
  - ~ 84,000 cars on the road for one year or
  - ~ 50,000 single family homes for one year

Dozer with diesel particulate filter

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http://www.epa.gov/nrmrl/pubs/600r08049/600r08049.htm

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- **SERG Outline**
  - Renewable Technologies (basics, assessments, costs, success stories)
    - Solar
    - Wind
    - Landfill Gas-to-Energy
    - Anaerobic Digestion
    - Biomass Gasification
    - Cleaner Diesel
  - Funding Resources and Opportunities

LFG flares at OII site, CA

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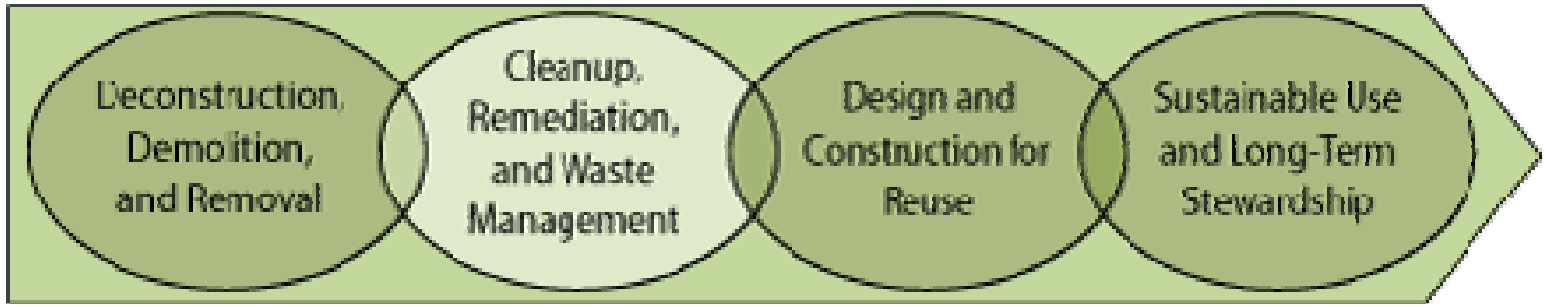
- **SERG Outline (continued)**
  - Tools – Calculators, References, Programs
  - Appendices
    - More on Technologies
    - Contract Language
    - Federal Regulations
    - Utility Programs

Gasifier fueled with poultry waste, WV

EPA HQ Efforts in Green Remediation

- Guidance (Fact Sheet, Primer, etc.)
- Training (e.g. NARPM conference)
- Funding for projects (e.g., energy calculator upgrade)
- GR covers many items, not just energy savings…it's all about BMPs.



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In general, the GR Primer covers the following sustainability topics:

- Saving energy (renewables use, optimization of systems)
- Saving water resources
- Water quality protection
- Ecological and soil preservation

GR Primer: http://cluin.org/download/remed/Green-Remediation-Primer.pdf

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EPA "NARPM" Conference (July '08)
Full Day Green Remediation Session

- Message: Green Remediation does NOT mean that responsible parties should not clean up (cleanup goals are still applicable)

- Definitions, case studies

- Metrics, Life Cycle Analysis

- Contracts tools are out there (language), but no regulations

- EPA Headquarters backing

Other Related Activities???

EPA Effort with Battelle at PNNL on Energy Calculator
Battelle Conference GR Session (May ’08)
Cal EPA “Green Team”
ITRC Team Proposal – “Green and Sustainable Remediation”
Sustainable Remediation Forum (SuRF) (industry, regs, etc.)
Various US EPA HQ workgroups (CCCL, GRRR, etc.)
US EPA Engineering Forum “Green Remediation” Subcommittee
US EPA Collaboration with NASA on GR issues (TEERM)?

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Case studies:

Pemaco site (Maywood, CA)
- renewables application for energy needs (~5900 kWh/yr)
- solar panels used for implementation of ERH remedy

OII Landfill (Monterey Park, CA)
- example of using waste products to create energy
- methane gas piped to nearby microturbines and used to create electricity (estimated savings of $400K / year in energy costs)

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More Case Studies:

Camp Pendleton – Diesel Emission Reduction activities (Reg 9 / Navy SW Div collaboration)

Portland Harbor (OR) Clean Diesel Evaluation
– reduced diesel PM by using emission control technologies and cleaner fuels

Nebraska Wind Power Pilot Study
- 100 kW wind turbine
- provided power for GW circulation well system
- 50 gpm system on site

LLNL Site 300, CA
- solar powered water treatment units

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Tools

- Guidance documents (SERG, Primer, etc.)
(See http://www.clu-in.org/greenremediation/)

- Contracts language
  - internal to EPA, but others can adapt their contracts too
  - requires contractors to consider renewable energy use, etc.
  - contact mcdaniel.penelope@epa.gov for information

- Life Cycle Analysis
  - consider all factors in designing / implementing remediation systems
  - may include energy, raw materials, waste mgt, transportation, etc.
  - Cal EPA is good resource (BBoughto@dtsc.ca.gov)

- 3rd Party Green Cleanup Certification (energy use, water use, soil/materials reuse, ecosystem enhancements)

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Example Contracts Language

Region 9 – RAC II SOW

Clean Air

In the performance of all activities performed under this contract, the contractor shall where directed by EPA use cleaner engines, cleaner fuel and cleaner diesel control technology on diesel powered equipment with engines greater than 50 horsepower whether the equipment is owned or rented. Direction will be provided on a Task Order by Task Order basis. The contractor shall provide a break-out cost for each task order in accordance with the instruction in contract clause addressing Task orders.

Cleaner engines include non-road engines meeting Tier I or cleaner standards and on-road engines meeting 2004 On-Highway Heavy Duty Engine Emissions Standards or cleaner, whether the equipment is owned or rented. Cleaner fuels include biodiesel blends or ultra low sulfur diesel. Cleaner diesel control technology includes EPA or California Air Resources Board ("CARB") verified diesel particulate filters ("DPFs") or diesel oxidation catalysts ("DOCs"). The contractor shall track emissions reduced (i.e., tons of diesel particulate matter reduced) associated with using cleaner diesel equipment and fuels.

Renewable Energy

The contractor shall evaluate all reasonably feasible renewable energy sources when conducting work related to selecting a cleanup remedy, constructing a cleanup remedy, and when optimizing an existing cleanup remedy. Sources of renewable energy include solar, wind, and biomass and biogas. Examples of renewable energy technologies include photovoltaic panels, wind turbines, digesters, gasifiers, and micro turbines. Part of evaluating renewable energy sources and technologies will involve a cost analysis, comparing the energy costs from renewable sources versus traditional electricity sources provided by local utilities, over the expected life of the cleanup remedy. Similarly, an evaluation of the avoided emissions as a result of using renewable energy sources versus traditional energy sources provided by local utilities shall be performed. The contractor shall also evaluate the cost of purchasing green power from organizations that offer green power within the appropriate state.

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  - Mike Montgomery (EPA Region 9)
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  - EPA's Superfund Engineering Forum

Cleanup - Clean Air

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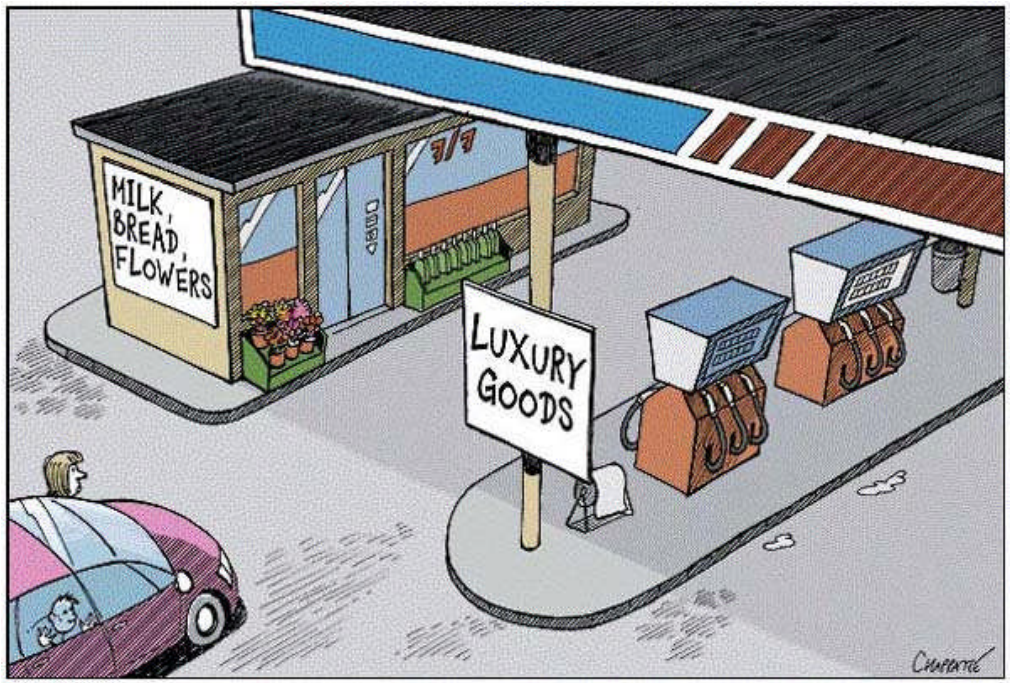
(Wall Street Journal)



(MSNBC)

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Questions??

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